## Claims

We claim:

No. 5

- A Borellia burgdorferi epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQEGAQQP-(beta-A)(beta-,4)C; EIAAKAIGKKIHQNNG-(beta-A)(beta-A)C; ISTLIKQKLDGLKNE-(beta-A)(beta-A)C; PWAESPKKPE-(beta-A)(beta-A)C; DKKAINLDKAQQKLD-(beta-A)(beta-A)C; ITKGKSQKSLGD-(beta-A)(beta-A)C; and GMTFRAQEGAFLTG-(beta-A)(beta-A)C.
- 2. The composition of matter of claim 1, wherein said epitope polypeptide comprises VQEGVQQEGAQQP-(beta-A)(beta-,4)C.
  - 3. The composition of matter of claim 2, wherein said epitope polypeptide consists essentially of VQEGVQQEGAQQP-(beta-A)(beta-74)C.
- 15 4. The composition of matter of claim 1, wherein said epitope polypeptide comprises EIAAKAIGKKHQNNG-(beta-A)(beta-A)C.
  - 5. The composition of matter of claim 4, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A)(beta-A)C.
- 20 6. The composition of matter of claim 1, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A)(beta-A)C.
  - 7. The composition of matter of claim 6, wherein said epitope polypeptide consists essentially of ISTLIKQKLDGLKNE-(beta-A)(beta-A)C.
- 25 8. The composition of matter of claim 1, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A)(beta-A)C.
  - 9. The composition of matter of claim 8, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A)(beta-A)C.
- 30 10. The composition of matter of claim 1, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A)(beta-A)C.
  - 11. The composition of matter of claim 10, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A)(beta-A)C.
- 35 12. The composition of matter of claim 1, wherein said epitope

polypeptide comprises ITKGKSQKSLGD-(beta-A)(beta-A)C.

- 13. The composition of matter of claim 12, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A)(beta-A)C.
- 5 14. The composition of matter of claim 1, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A)(beta-A)C.
  - 15. The composition of matter of claim 14, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A)(beta-A)C.

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16. A vaccine for immunizing against or treating for Lyme disease, the vaccine comprising an epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQEGAQQR-(beta-A)(beta-,4)C ; EIAAKAIGKKIHQNNG-(beta-

- A) (beta-A) C; ISTLIKQKLDGLKNE-(beta-A) (beta-A) C; PWAESPKKPE-(beta-A) (beta-A) C; DKKAINLDKAQQKLD-(beta-A) (beta-A) C; ITKGKSQKSLGD-(beta-A) (beta-A) C; and GMTFRAQEGAFLTG-(beta-A) (beta-A) C.
- 17. The vaccine of claim 16, wherein said epitope polypeptide comprises VQEGVQQEGAQQP-(beta-A)(beta-,4)C.
  - 18. The vaccine of claim 1% wherein said epitope polypeptide consists essentially of VQEGVQQEGAQQP-(beta-A)(beta-,4)C.
  - 19. The vaccine of claim 16, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNG-(beta-A)(beta-A)C.
- 25 20. The vaccine of claim 19, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A)(beta-A)C.
  - 21. The vaccine of claim 16, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A)(beta-A)C.
  - 22. The vaccine of claim 21, wherein said epitope polypeptide consists essentially of ISTLIKOKLDGLKNE-(beta-A)(beta-A)C.
    - 23. The vaccine of claim 16, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A)(beta-A)C.
    - 24. The vaccine of claim 23, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A)(beta-A)C.
- 35 25. The vaccine of claim 16, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A)(beta-A)C.

- 26. The vaccine of claim 25, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A)(beta-A)C.
- 27. The vaccine of claim 16, wherein said epitope polypeptide comprises ITKGKSQKSLGD-(beta-A)(beta-A)C.
- 5 28. The vaccine of claim 27, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A)(beta-A)C.
  - 29. The vaccine of claim 28, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A)(beta-A)C.
- 30. The vaccine of claim 29, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A)(beta-A)C.

31. The nucleic acid sequence coding for a Borellia burgdorieri epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQEGAQQP-(beta-

- A) (beta-, 4 C; EIAAKAIGKKIHQNNG-(beta-A) (beta-A) C; .

  ISTLIKQKLDGLKNE-(beta-A) (beta-A) C; PWAESPKKPE-(beta-A) (beta-A) C;

  DKKAINLDKAQQKLD-(beta-A) (beta-A) C; ITKGKSQKSLGD-(beta-A) (beta-A) C; and GMTFRAQEGAFLTG-(beta-A) (beta-A) C.
- 32. The composition of matter of claim 31, wherein said epitope polypeptide comprises VQEGVQQEGAQQP-(beta-A)(beta-,4)C.
  - 33. The composition of matter of claim 32, wherein said epitope polypeptide consists essentially of VQEGVQQEGAQQP-(beta-A)(beta-A)C.
- 34. The composition of matter of claim 31, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNG-(beta-A)(beta-A)C.
  - 35. The composition of matter of claim 34, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A)(beta-A)C.
- 30 36. The composition of matter of claim 31, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A)(beta-A)C.

  37. The composition of matter of claim 36, wherein said epitope polypeptide consists essentially of ISTLIKQKLDGLKNE-
- 35 38. The composition of matter of claim 31, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A)(beta-A)C.

(beta-A) (beta-A) C.

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- 39. The composition of matter of claim 38, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A)(beta-A)C.
- 40. The composition of matter of claim 31, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A)(beta-A)C.
- 41. The composition of matter of claim 40, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A)(beta-A)C.
- 42. The composition of matter of claim 31, wherein said 10 epitope polypeptide comprises ITKGKSQKSLGD-(beta-A)(beta-A)C.
  - 43. The composition of matter of claim 42, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A)(beta-A)C.
- 44. The composition of matter of claim 31, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A)(beta-A)C.
  - 45. The composition of matter of claim 44, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A)(beta-A)C.